



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2016/2017		
MASTER'S DEGREE (MSC)	BIODIVERSITY AND ENVIRONMENTAL BIOLOGY		
INTEGRATED COURSE	PRINCIPLES OF ENVIRONMENTAL CHEMISTRY AND BIOCHEMISTRY		
CODE	18645		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	CHIM/12, BIO/10		
HEAD PROFESSOR(S)			
OTHER PROFESSOR(S)	MACCOTTA ANTONELLA	Ricercatore	Univ. di PALERMO
CREDITS	6		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	MACCOTTA ANTONELLA Tuesday 13:30 15:30 Via Archirafi, 20 - V piano		

DOCENTE:

PREREQUISITES	The student should have the basic knowledge of the disciplines that have been taught during the first degree by the teachers, with particular reference to Biochemistry (SSD BIO/10) and General Chemistry and Organic Chemistry (SSD CHIM/03 e CHIM/06) which will contribute to the teaching of the integrated course "Principles of Environmental Chemistry and Biochemistry"
LEARNING OUTCOMES	At the end of the course it is expected that students <ul style="list-style-type: none"> • demonstrate knowledge and understanding that allow them to develop and / or apply original ideas, even in a research context; • can apply their knowledge and understanding, applying knowledge and understanding, and ability to solve problems in new areas, within broader contexts related to their field of study; • have the ability to integrate knowledge and handle complexity, and making judgment even on the basis of incomplete or limited information. • have the ability to communicate clearly and unambiguously their conclusions to specialist and non-specialist • have developed those learning skills that enable them to continue studying mostly independently.
ASSESSMENT METHODS	The test will be both written (module of Chemistry applied to the environment with exercises) and oral (module of Biochemistry applied to the environment). The written test will last for 1 h with 5 open questions. Details of this test are described in the module of "Chemistry applied to the environment". The oral test will consist of an interview, in order to check that the student have skills and disciplinary knowledge provided by the course; the assessment will be expressed in thirtieths. The questions tend to verify a) the knowledge acquired, through the ability to establish connections between the course content; b) the processing capacity, through the ability to place the subject content within the professional context, c) possession of adequate capacity, with evaluation gradually varying between a minimum (if the property of language is appropriate to the professional context but not sufficiently articulated) and a maximum (if it will be demonstrated full mastery of technical language).
TEACHING METHODS	The teaching will be developed in parallel by the two teacher in relation to their respective competencies, with lessons, training and laboratory

MODULE
APPLIED ENVIRONMENTAL BIOCHEMISTRY WITH PRACTICE

SUGGESTED BIBLIOGRAPHY

I principi di biochimica di Lehninger di David L. Nelson, Michael M. Cox edizione 2016
Slides delle lezioni svolte, relativi articoli scientifici pubblicati su riviste internazionali, ricerche sviluppate su siti internet.

AMBIT	20490-A scelta dello studente
INDIVIDUAL STUDY (Hrs)	47
COURSE ACTIVITY (Hrs)	28

EDUCATIONAL OBJECTIVES OF THE MODULE

The module aims to present to the student the biochemical mechanisms of adaptation to environmental conditions with the identification of molecular markers, including those resulting from environmental stress conditions. On this path will be assessed structural and functional adaptations to particular conditions useful as study models. The examples will include the formation of free radicals and the development of antioxidant mechanisms. The analysis of the conditions that determine oxidative stress and the damages caused by this condition. The mechanisms of structural and functional adaptation to extreme environmental conditions useful as study models.

SYLLABUS

Hrs	Frontal teaching
4	Free radicals: free radicals and chain reaction. Reactive oxygen species (ROS). Potential damage from free radicals. Benefits determined by free radicals. The antioxidant systems (superoxide dismutase, catalase, glutathione peroxidase). The main natural antioxidants. Oxidative stress
4	molecular mechanisms of oxidative stress and damage
4	mechanisms of structural, molecular and functional adaptation, to deep sea. The OML, the zone in which oxygen saturation in seawater in the ocean is at its lowest.
4	HIF: the transcriptional factor induced by hypoxia. Molecular mechanisms of activation and functional roles

Hrs	Practice
4	cell cultures
4	western blotting
4	Evaluation of Oxidative Stress Markers in cultured cancer cells treated with cytotoxic drugs
4	Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR).

MODULE
APPLIED ENVIRONMENTAL CHEMISTRY WITH PRACTICE

Prof.ssa ANTONELLA MACCOTTA

SUGGESTED BIBLIOGRAPHY

Colin Baird, Michael Cann - Chimica ambientale - Zanichelli
Stanley E. Manahan - Chimica dell'Ambiente - Piccin

AMBIT	20490-A scelta dello studente
INDIVIDUAL STUDY (Hrs)	47
COURSE ACTIVITY (Hrs)	28

EDUCATIONAL OBJECTIVES OF THE MODULE

The module aims to increase knowledge of important chemical processes related to different environmental compartments.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to Environmental Chemistry - Tropospheric pollution - Acid rain.
6	Toxic organic compounds.
4	Chemistry of natural waters.
2	Heavy metals.
2	Waste.
2	Soil and sediments.

Hrs	Practice
4	Spectrophotometric determination of Fe(III) concentration, calibration curve.
6	Acid-base potentiometric titration - Determination of conductivity in different types of water.